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EXAMINER

Stevens, Thomas H

ART UNIT PAPER NUMBER

2123

DATE MAILED: 04/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/641,591

Applicant(s)

ROSEDALE, PHILIP

Examiner

Thomas H. Stevens

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-54 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. Claims 1-54 were examined.

***Section I: Response to Applicant's Amendment (1/28/05)***

***Information Disclosure Statement***

2. In light of the discussion, between examiner and applicants, on January 4 (interview), the objection is withdrawn.

***Claim Rejections – 35 USC § 112 (1<sup>st</sup> and 2<sup>nd</sup>)***

3. In light of the discussion, between examiner and applicants, (i.e., words: passive feed back; signal generator; adapted; and substantially) on January 4, the rejections are withdrawn. However, a 112 2<sup>nd</sup> rejection for the word "system" stands due to its ambiguity of statutory type relative to how the word is depicted in the claims.

***Claim Rejections – 35 USC § 132***

4. In light of the discussion, between examiner and applicants, on January 4 (interview), the objection is withdrawn.

***Claim Rejections - 35 USC § 102 (e) and 35 USC § 103(a)***

5. Applicant's arguments, claims applicable under 35 U.S.C. 102(e) and 103(a) have been fully considered and are persuasive. Therefore, the rejection has been

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withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Edwards et al. (U.S. Patent 5,533,531 (1996)) and Wirtz (U.S. Patent 4,657,003 (1987)).

***Section II: Final Rejection (3<sup>rd</sup> Office Action)***

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

7. Claim 1-5,10-14, 23- 51,52-54 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The word "system" is ambiguous and indefinite by not defining which statutory type (i.e., apparatus or machine) the claims are declaring.

8. Regarding claims 6, 9-11,14,26, the phrase "such that" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention.

***Claim Rejections - 35 USC § 103***

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-26, 33,35,41, 43-54 are rejected under 35 U.S.C. 103 (a) as unpatentable by Bouten et al., ("Effects of Placement and Orientation of Body-Fixed Accelerometers on the Assessment of Energy Expenditure during Walking" (1997)) in view of Wirtz (U.S. Patent 4,657,003 (1987)) and in further view of Edwards et al. (U.S. Patent 5,533,531 (1996)). Bouten et al., teaches simulation of daily physical activity- using sensors (pg. 50, Introductions) but doesn't teach immobilizing body parts or the use of strain gauges (Edwards: column 4, lines 36-41). Wirtz teaches immobilizing device for retraining a body portion or limb to completely surround the body member (abstract); while Edwards et al. teaches a method of electronically aligning a first sensor having two substantially nonparallel sense axes producing first and second output (Bouten: pg. 50, right column 2nd paragraph) signals and carried by a garment to position a joint's first axis of movement with a second sensor having two substantially non-parallel sense axis (abstract).

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At the time of invention, it would have been obvious to one of ordinary skill in the art to modify Bouten et al., with Wirtz and Edwards et al. to avoid off-axis movement (Edwards: column 1, lines 55-59) in bio-mechanical research of intricacies of human body joint movement (Edwards: column 1, lines 12-14) with comfort (Wirtz: column 1, lines 35-37).

Claim 1: An input system for use with a simulated (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) environment, comprising: an immobilizing device (Wirtz: title) which restricts the motion of a portion of a user's body (Wirtz: column 3, lines 14-27); sensors which restricts the motion of a portion of a user's body (Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively); sensors which detect forces applied by the restricted portion of the user's body (Edwards: column 1, lines 12-41; Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10); a sensory feedback (Bouten: pg.54, table 1) device which provides a sensation to the user corresponding to the motion which occurs in the simulated environment (Edwards: columns 1 and 2, lines 63-67, 1-12, respectively).

Claim 2: An input system as in Claim 1 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively) respectively wherein the forces detected by the sensors are sent to the

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processing unit (Edwards: column 7, lines 1-6) to determine the motion of the user in the simulated environment (Bouten: pg. 53, section 3.5) to which the sensations provided by the sensory feedback (Bouten: pg.54, table 1) device will correspond (Bouten: pg. 54, table 1).

Claim 3: An input system as in Claim 1 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively) wherein the sensors comprise strain gauges (Edwards: column 4, lines 36-41) (Edwards: column 4, lines 36-41), which are disposed upon the immobilizing device.

Claim 4: An input system as in Claim 1 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively) wherein the sensory feedback (Bouten: pg.54, table 1) device comprises at least one vibrating element (Bouten: pg.50, right column, 2nd paragraph), which is disposed substantially adjacent to a nerve spindle (part of human body: Bouten: pg.51, 3<sup>rd</sup> paragraph, lines 5-8) of a muscle of the restricted portion of the user's body (Witz: column 3, lines 14-27).

Claim 5: An input device as in Claim 1 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12; Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively) wherein the sensory feedback (Bouten: pg.54, table 1) device is used to provide a sensation of movement to the user when no actual movement of the type corresponding to the sensation occurs (daily living conditions: Bouten: pg. 50, left column).

Claim 6: A method for providing feedback (Bouten: pg.54, table 1) to a user of a processing unit (Edwards: column 7, lines 1-6) (inherent: Bouten: pg. 50, introduction and Edwards: column 7, lines 1-5), comprising the steps of: providing an immobilizing device (Wirtz: title) which holds a portion of the user's body immobile; providing vibrating devices disposed upon the immobilizing device and positioned to touch the immobilized portion of the user's body (Wirtz: column 3, lines 14-27) near muscles which would extend if the immobilized portion of the user's body moved (Bouten: pg. 50, right column, lines 5-11); sending signals from the processing unit (Edwards: column 7, lines 1-6) (Edwards: column 7, lines 1-6) to the vibrating devices to cause the vibrating devices to vibrate (Bouten: pg. 50, right column, lines 5-11); controlling these signals (Edwards: column 7, lines 7-29) such that the vibrating devices located near a particular muscle vibrate (Bouten: pg. 53, figure 3 with pg. 50, right column, lines 5-12) to provide feedback (Bouten: pg.54, table 1) indicating that



the immobilized portion (Witz: columns 9-10, lines 65-67 and 1-16, respectively) of the user's body is moving (Bouten: pg. 50, left column, line 16).

Claim 7: A method as in Claim 6 (inherent: Bouten: pg. 50, introduction and Edwards: column 7, lines 1-5; Witz: column 3, lines 14-27; Bouten: pg. 50, right column, lines 5-11; Witz: columns 9-10, lines 65-67 and 1-16) respectively wherein the signals sent to the vibrating devices by the processing unit (Edwards: column 7, lines 1-6) (Edwards: column 7, lines 1-6) are controlled (Edwards: column 7, lines 7-29) based upon the forces exerted by the immobilized portion of the user's body (Witz: column 3, lines 14-27) against the immobilizing device.

Claim 8: A method as in Claim 7 (inherent: Bouten: pg. 50, introduction and Edwards: column 7, lines 1-5; Witz: column 3, lines 14-27; Bouten: pg. 50, right column, lines 5-11; Witz: columns 9-10, lines 65-67 and 1-16; Edwards: column 7, lines 1-6; Witz: column 3, lines 14-27) wherein the forces exerted against the immobilizing (Witz: title) device are measured using strain gauges (Edwards: column 4, lines 36-41) (Edwards: column 4, lines 36-41) disposed upon the immobilizing device.

Claim 9: A method as in Claim 7 (inherent: Bouten: pg. 50, introduction and Edwards: column 7, lines 1-5; Witz: column 3, lines 14-27; Bouten: pg. 50, right column, lines 5-11; Witz: columns 9-10, lines 65-67 and 1-16; Edwards: column

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7, lines 1-6; Witz: column 3, lines 14-27) wherein the signals are sent to the vibrating devices (Bouten: pg. 50, right column, 2<sup>nd</sup> paragraph, lines 1-4) such that the feedback (Bouten: pg.54, table 1) provided indicates to the user that the immobilized portion of the user's body is moving in the way it would have moved were it not immobilized.

Claim 10: An input system for a user comprising an immobilizing device (Wirtz: title) which restricts the motion (Wirtz: column 12, lines 11-25) of a portion of the user's body a vibrating device disposed substantially adjacent to a nerve spindle (part of human body: Bouten: pg.51, 3<sup>rd</sup> paragraph, lines 5-8) of a muscle of the user's body which extends when the restricted portion of the user's body moves, (Edwards: column 1, lines 12-41; Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) and a processing unit (Edwards: column 7, lines 1-6) (Edwards: column 7, lines 1-6) which sends signals to the vibrating devices to control the operation of the vibrating devices, the processing unit (Edwards: column 7, lines 1-6) controlling the signals (Edwards: column 7, lines 1-6) such that the vibrating devices located adjacent to a particular muscle provide feedback (Bouten: pg.54, table 1) indicating that the restricted portion of the user's body is moving.

Claim 11: An input system as in Claim 10 (Wirtz: title; column 12, lines 11-25; Edwards: column 1, lines 12-41; Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) wherein the vibrating device comprises a signal generator adapted for connection

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to a body at a location such that it will affect the signal sent by the nerve spindle (part of human body: Bouten: pg.51, 3rd paragraph, lines 5-8) to the brain.

Claim 12: An input system as Claim 10 (Wirtz: title; column 12, lines 11-25; Edwards: column 1, lines 12-41; Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) wherein the signals sent to the vibrating devices by the processing unit (Edwards: column 7, lines 1-6) are controlled (Edwards: column 7, lines 7-29) based upon the forces exerted by the immobilized portion of the user's body against the immobilizing device.

Claim 13: An input system as in Claim 12 (Wirtz: title; column 12, lines 11-25; Edwards: column 1, lines 12-41; Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) wherein the forces exerted against the immobilizing device are measured using strain gauges (Edwards: column 4, lines 36-41) disposed upon the immobilizing device.

Claim 14: An input system as in Claim 10 (Wirtz: title; column 12, lines 11-25; Edwards: column 1, lines 12-41; Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) wherein the signals are sent to the vibrating devices such that the feedback (Bouten: pg.54, table 1) provided indicates to the user that the immobilized portion of the user's body (daily living conditions: Bouten: pg. 50, left column) is moving in the way it would have moved were it not immobilized.

Claim 15: A method for providing, (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) an indication to a user that his body has moved when it has not, (daily living conditions: Bouten: pg. 50, left column) comprising: preventing an intended motion of a portion of a user's body, wherein the portion of the user's body is substantially immobilized (Wirtz: title and Edwards: abstract); and providing sensory feedback (Bouten: pg.54, table 1) which is a reflection of the intended motion (Bouten: pg. 54, table 1).

Claim 16: A method as in Claim 15 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract) further comprising the step of immobilizing the portion of the user's body (Wirtz: column 3, lines 14-27).

Claim 17: A method as in Claim 15 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract) wherein the sensory feedback (Bouten: pg.54, table 1) comprises a vibration produced by a vibrating element (Bouten: pg.50, right column, 2nd paragraph) placed against the user's body

Claim 18: A method as in Claim 17 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract) wherein the sensory feedback (Bouten: pg.54, table 1)

provided suspends the feedback (Bouten: pg.54, table 1) provided naturally by the user's body, which reflects the actual motion of the portion of the user's body.

Claim 19: A method as in Claim 16 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract; Wirtz: column 3, lines 14-27) wherein the step of immobilizing a portion of the user's body further comprises attaching the portion of the user's body to a rigid structure so as to restrict (Wirtz: column 3, lines 14-27) the motion of the portion of the user's body.

Claim 20: A method as in Claim 19, (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract; Wirtz: column 3, lines 14-27) wherein the step of detecting the intended motion comprises measuring the force (can be derived from acceleration formula: Bouten: pg. 50, list of symbols and pg. 53, left column 4<sup>th</sup> paragraph) applied against the rigid structure by the immobilized portion of the user's body.

Claim 21: A method as in Claim 20 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract; Wirtz: column 3, lines 14-27) wherein the force applied against the rigid structure is measured by using strain gauges (Edwards: column

4, lines 36-41) to detect the deflection of the structure due to the force applied (can be derived from acceleration formula: Bouten: pg. 50, list of symbols and pg. 53, left column 4<sup>th</sup> paragraph) against it.

Claim 22: A method as in Claim 15 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; daily living conditions: Bouten: pg. 50, left column; pg. 54, table 1; Wirtz: title and Edwards: abstract) wherein the step of detecting the intended motion comprises measuring the direction and magnitude of the forces applied (can be derived from acceleration formula: Bouten: pg. 50, list of symbols and pg. 53, left column 4<sup>th</sup> paragraph) by the immobilized portion of the user's body.

Claim 23: An input system for use with a simulator, (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) comprising an immobilizing device (Wirtz: title) a processing unit (Edwards: column 7, lines 1-6), and an output (Bouten: pg. 50, right column 2nd paragraph) system the immobilizing device holding the head of a user in a substantially fixed position (Edwards: abstract) with respect to the user's torso and further comprising sensors (Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) to detect a force exerted by the user in attempting to move the user's head (Wirtz: column 9, lines 38-45 with figure 16), and the processing unit (Edwards: column 7, lines 1-6) calculating the effect of the force applied by the user in a simulated environment (Edwards: columns 1 and 2, lines

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63-67, 1-12, respectively) and presenting this effect in the simulated environment to the user via the output (Bouten: pg. 50, right column 2nd paragraph) system.

Claim 24: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) wherein the output (Bouten: pg. 50, right column 2nd paragraph) system corresponds to a remotely operated physical device: which is operated according to the input system and which is controlled through the processing unit (Edwards: column 7, lines 1-6) and represented in the simulated environment (Edwards: columns 1 and 2, lines 63-67, 1-12, respectively).

Claim 25: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) further comprising vibration devices (Bouten: pg.50, right column, 2nd paragraph), the vibration devices (Bouten: pg.50, right column, 2nd paragraph) touching the user within the immobilizing device and being controlled by the processing unit (Edwards: column 7, lines 1-6) to provide sensations for the user which mimic the sensations which would be felt during motion of the immobilized portion of the user's body as it moves in the simulated environment.

Claim 26: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively)

wherein the processing unit (Edwards: column 7, lines 1-6) is programmed to use a physical model for the simulated environment, (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) which provides passive feedback (Bouten: pg.54, table 1) by immobilizing the user ***such that*** the user applies force against the immobilizing device in a manner, which reflects the forces, (can be derived from acceleration formula: Bouten: pg. 50, list of symbols and pg. 53, left column 4<sup>th</sup> paragraph) which would be applied to the user in the simulated environment.

Claim 27. An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) wherein the immobilizing input device comprises a securement device within which the user places his head and which is rigidly attached to a seat (seat: design choice) upon which the user sits during use of the input system.

Claim 33: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) wherein the sensors comprise strain gauges (Edwards: column 4, lines 36-41).

Claim 35: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) further comprising at least one additional immobilizing device which holds an arm of the user from the elbow to the hand in a substantially fixed position with



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respect to the torso (Wirtz: column 3, lines 14-42 with figures 16 and 17) of the user and which further comprises sensors disposed so as to measure the forces (force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) exerted by the arm of the user at least at a point near the elbow (Wirtz: column 3, lines 14-42 with figures 6, 16 and 17) of the user and at a point near the wrist of the user.

Claim 36: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively; force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) wherein the additional immobilizing device detects the forces exerted by the user in attempting to move his arm (Wirtz: column 3, lines 14-42 with figures 16 and 17) and sends this information to the processing unit (Edwards: column 7, lines 1-6).

Claim 37: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively; force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) further comprising at least one additional immobilizing device which holds a leg of the user from the knee to the foot in a substantially fixed position (Wirtz: column 3, lines 14-42 with figures 16 and 17) with respect to his torso and which further comprises pressure sensors disposed so as to measure the forces

(force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) exerted by the leg of the user at least at a point near the knee of the user and at a point near the ankle of the user.

Claim 38: An input system as in Claim 37(Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively; force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) wherein the additional immobilizing device detects the forces (force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) exerted by the user in attempting to move his leg and sends this information to the processing unit (Edwards: column 7, lines 1-6)

Claim 39: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively; force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs) wherein the visual display of the output (Bouten: pg. 50, right column 2nd paragraph) system fills substantially all of the visual field of view of the user when the user's head is immobilized (Wirtz: figure 13, with columns 8 and 9, lines 64-67, 1-20) within the input system.

Claim 41: An input system as in Claim 23 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively)

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wherein additional input signals are sent to the processing unit (Edwards: column 7, lines 1-6) by an additional input device disposed upon the immobilizing device.

Claim 43: An input system as in Claim 41 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) wherein the additional input device comprises one or more buttons (Marconi: column 7, lines 24-25).

Claim 44: An input system as in Claim 41 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) wherein the additional input device comprises a joystick (Marconi: column 7, lines 24-25).

Claim 45: An input system for use with a computer (Edwards: column 8, lines 34-40) comprising at least one immobilizing device (Wirtz: abstract) which holds a portion of the body of a user of the system in a substantially fixed position, the immobilizing device comprising sensors and vibration devices (Bouten: pg.50, right column, 2nd paragraph), the sensors being configured to detect forces exerted by the user in attempting to move the portion of the body held by the immobilizing device, the sensors sending signals representing the magnitude and direction of these forces to the computer, and the vibration devices (Bouten: pg.50, right column, 2nd paragraph) disposed upon the muscles of the user and

controlled by the computer (Edwards: column 7, line 7-29) so as to provide sensations which mimic the sensations which would be felt if the attempted motion had occurred.

Claim 46: An input system as in Claim 45 (Edwards: column 8, lines 34-40; Bouten: pg.50, right column, 2nd paragraph; Wirtz: abstract) further comprising a movable frame which is connected to the computer and actuators which are capable of moving the frame, wherein the user and the immobilizing device are located within the frame, and the actuators are controlled (Edwards: column 7, lines 7-29) by the computer so as to coordinate the motion of the frame to provide motion feedback (Bouten: pg.54, table 1) to the user of the system.

Claim 47: An input system as in Claim 45 (Edwards: column 8, lines 34-40; Bouten: pg.50, right column, 2nd paragraph; Wirtz: abstract; Edwards: abstract) wherein the head of the user is immobilized with respect to the torso of the user by the immobilizing device and further comprising a visual display disposed in fixed relation to the user's head, the display connected to the computer and configured to provide visual feedback (Bouten: pg.54, table 1) to the user of the system.

Claim 48: An input system as in Claim 47 (Edwards: column 8, lines 34-40; Bouten: pg.50, right column, 2nd paragraph; Wirtz: abstract; Edwards: abstract)

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wherein the visual feedback (Bouten: pg.54, table 1) provided encourages the user to apply forces to the immobilizing device in order to control the visual display (Edwards: column 8, lines 35-40).

Claim 49: An input system as in Claim 45 (Edwards: column 8, lines 34-40; Bouten: pg.50, right column, 2nd paragraph; Wirtz: abstract) wherein the input system is used to control a physical device, which is connected to the computer (Edwards: column 8, lines 35-40).

Claim 50: An input system as in Claim 49 (Edwards: column 8, lines 34-40; Bouten: pg.50, right column, 2nd paragraph; Wirtz: abstract) wherein the physical device comprises a remotely operated machine (design choice)

Claim 51: An input system as in Claim 49 (Edwards: column 8, lines 34-40; Bouten: pg.50, right column, 2nd paragraph; Wirtz: abstract) wherein the computer controls the vibration devices (Bouten: pg.50, right column, 2nd paragraph) to provide feedback (Bouten: pg.54, table 1) to the user which is based upon the motion of the physical device.

Claim 52: A method for a user to control an environment simulated (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10) on a computer system where the user is modeled within the simulated environment, comprising: providing at least one immobilizing

device which restricts the motion of at least a portion of the user's body (Wirtz: column 3, lines 14-27; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively); detecting the forces exerted by the immobilized portion (Wirtz: title) of the user's body against the immobilizing device; sending a signal representing these forces (can be derived from acceleration formula: Bouten: pg. 50, list of symbols and pg. 53, left column 4<sup>th</sup> paragraph) to the computer system; and determining the effect that these forces (can be derived from acceleration formula: Bouten: pg. 50, list of symbols and pg. 53, left column 4<sup>th</sup> paragraph) have upon the model of the user in the environment simulated by the computer.

Claim 53: A method as in Claim 52 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively) wherein forces exerted by the immobilized portion of the user's body are detected by measuring the deflection (inherent) of the immobilizing device.

Claim 54: A method as in Claim 53 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Edwards: columns 1 and 2, lines 63-67, 1-12, respectively) wherein the deflection of the immobilizing device is measured using strain gauges (Edwards: column 4, lines 36-41) disposed upon the immobilizing device.

12. Claims 28-32, 34 and 40 are rejected under 35 U.S.C. 103 (a) as unpatentable by Bouten et al., ("Effects of Placement and Orientation of Body-Fixed Accelerometers

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on the Assessment of Energy Expenditure during Walking" (1997)) in view of Wirtz (U.S. Patent 4,657,003 (1987)) and in further view of Edwards et al. (U.S. Patent 5,533,531 (1996)) and Maguire, Jr. (U.S. Patent 5,734,421 (1998)). Bouten et al., teaches simulation of daily physical activity-using sensors (pg. 50, Introductions) but doesn't teach immobilizing body parts or the use of strain gauges (Edwards: column 4, lines 36-41) or the use of headgear. Wirtz teaches immobilizing device for retraining a body portion or limb to completely surround the body member (abstract); while Edwards et al. teaches a method of electronically aligning a first sensor having two substantially nonparallel sense axes producing first and second output (Bouten: pg. 50, right column 2nd paragraph) signals and carried by a garment to position a joint's first axis of movement with a second sensor having two substantially non-parallel sense axis (abstract); and Maguire teaches simulation of head movements via virtual reality.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify Bouten et al., with Wirtz, Edwards et al. and Maguire, Jr. to avoid off-axis movement (Edwards: column 1, lines 55-59) in bio-mechanical research of intricacies of human body joint movement (Edwards: column 1, lines 12-14) to include the human head (Maguire: figure 1 with column 3, lines 51-60) without discomfort (Wirtz: column 1, lines 35-37).

Claim 28: An input system as in Claim 27, (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title and columns 9 and 10, lines 38-45 and 17-21, respectively;

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Edwards: abstract) wherein the securement device comprises a helmet (Maguire: figure 1 with column 3, lines 51-60).

Claim 29: An input system as in Claim 27, (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title and columns 9 and 10, lines 38-45 and 17-21, respectively;

Edwards: abstract) wherein the securement device comprises a stiff headband.

Claim 30: An input system as in Claim 27 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title and columns 9 and 10, lines 38-45 and 17-21, respectively;

Edwards: abstract) wherein the securement device comprises a pair of substantially semi-circular braces, one of which is placed upon the rear of the user's head and the other of which is fit snugly to the front of the user's head above the eyes and about the temples (Note: the examiner interprets the helmet feature superceding the semi-circular brace; while stating inherency to "fit snugly to front of user's head").

Claim 31: An input system as in Claim 27 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title and columns 9 and 10, lines 38-45 and 17-21, respectively;

Edwards: abstract) wherein the securement device is attached to the seat of the system using at least one support member (Maguire: 6A (108) with column 12, 35-46).



Claim 32: An input system as in Claim 31 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title and columns 9 and 10, lines 38-45 and 17-21, respectively; Edwards: abstract) wherein the sensors are disposed upon the support member (Maguire: 6A (108) with column 12, 35-46).

Claim 34: An input system as in Claim 33 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively) wherein the sensors are disposed in two sets of opposing pairs on each support member (Maguire: figure 6A (108) with column 12, lines 35-46).

Claim 40: An input system as in Claim 39 (Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively; force calculation derived from acceleration: Bouten: pg. 53 3<sup>rd</sup> and 4<sup>th</sup> paragraphs; Bouten: pg. 50, right column 2nd paragraph) wherein the visual display comprises a screen which is positioned between the user's head and a projection system located on the opposite side of the screen as the user's head (Maguire: column 2, lines 14-29).

13. Claim 42 is rejected under 35 U.S.C. 103 (a) as unpatentable by Bouten et al., ("Effects of Placement and Orientation of Body-Fixed Accelerometers on the Assessment of Energy Expenditure during Walking" (1997)) in view of Wirtz (U.S. Patent 4,657,003 (1987)) and in further view of Edwards et al. (U.S. Patent 5,533,531

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(1996)) and Marci et al. (U.S. Patent 6,183,259 (1998)). Bouten et al., teaches simulation of daily physical activity-using sensors (pg. 50, Introductions) but doesn't teach immobilizing body parts or the use of strain gauges (Edwards: column 4, lines 36-41). Wirtz teaches immobilizing device for retraining a body portion or limb to completely surround the body member (abstract); while Edwards et al. teaches a method of electronically aligning a first sensor having two substantially nonparallel sense axes producing first and second output (Bouten: pg. 50, right column 2nd paragraph) signals and carried by a garment to position a joint's first axis of movement with a second sensor having two substantially non-parallel sense axis (abstract); and Marci et al. teaches simulation of physical movements with, subsequently, the use of a joy stick and other input devices (column 7, lines 26).

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify Bouten et al., with Wirtz, Edwards et al. and Marci et al., to avoid off-axis movement (Edwards: column 1, lines 55-59) in bio-mechanical research of intricacies of human body joint movement (Edwards: column 1, lines 12-14) with comfort (Wirtz: column 1, lines 35-37) while adjusting movements with a joy stick (Marci: figure 1 with column 3, lines 51-60).

Claim 42: An input system as in Claim 41(Bouten: pg. 51, 3<sup>rd</sup> paragraph, lines 4-10; Wirtz: title; Wirtz: columns 9 and 10, lines 38-45 and 17-21, respectively; Edwards: abstract) wherein the additional input device comprises a gun handle and trigger (Marci: column 7, lines 25-25).

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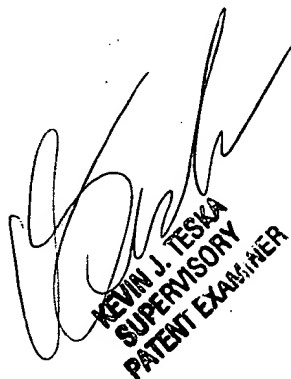
***Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Tom Stevens whose telephone number is 571-272-3715, Monday-Friday (8:00 am- 4:30 pm) or contact Supervisor Mr. Kevin Teska at (571) 272-3716. Fax number is 571-273-3715.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

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THS



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